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Claims

1. A complex comprising a magnesium dihalide and an electron donor, **characterized** in that it is a complex of the magnesium dihalide and the electron donor and has the following formula (I) expressing the molar ratio between the magnesium dihalide and the electron donor:

$$MgX_2 \cdot [R(OR')_n]_m \qquad (I)$$

wherein MgX_2 is the magnesium dihalide and $R(OR')_n$ is the electron donor, X is a halogen, R is an n-valent C_1-C_{20} aliphatic group, an n-valent C_7-C_{27} araliphatic group or an n-valent C_2-C_{22} acylic group, R' is a C_1-C_{20} alkyl group or a C_7-C_{27} aralkyl group, n is a number from 1 to 6 and m is defined as a number $0.5 \leq m \leq 2.0$.

2. The complex according to Claim 1, **characterized** in that X is selected from Cl, Br and I, and is preferably Cl.

3. The complex according to Claim 1 ~~or 2~~, **characterized** in that R is an n-valent C_2-C_{22} acylic group, preferably an n-valent aromatic C_7-C_{22} acylic group, most preferably phthaloyl.

4. The complex according to Claim 1, ~~2 or 3~~, **characterized** in that R' is a C_6-C_{16} alkyl group, preferably a C_6-C_{12} alkyl group like undecyl or 2-ethyl-1-hexyl.

5. The complex according to ~~any preceding claim~~, **characterized** in that n is 1 to 4, preferably about 2.0.

6. The complex according to ~~any preceding claim~~, **characterized** in that m is 0.67 to 1.0.

7. The complex according to ~~any preceding claim~~, **characterized** in that it is a magnesium dichloride phthalic acid ester complex having the formula (II):

$$MgCl_2 \cdot C_6H_4(COOR')_2 \qquad (II)$$

wherein R' is the same as above.

8. The complex according to ~~one of Claims 1 to 5~~, **characterized** in that it is a magnesium dichloride phthalic acid ester complex having the formula (III):

$$(MgCl_2)_3 \cdot [C_6H_4(COOR')_2]_2 \qquad (III)$$

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wherein R' is the same as above.

9. The complex according to ~~any preceding claim~~, **characterized** in that it has an X-ray diffraction pattern showing a dominant peak at 4.5°2Θ.

10. Process for the preparation of a complex according to ~~any preceding claim~~ comprising a magnesium dihalide and an electron donor, **characterized** by reacting a magnesium compound (a) containing an alkoxy moiety, which magnesium compound is selected from the group consisting of a complex of a magnesium dihalide and a magnesium dialkoxide, a complex of a magnesium dihalide and an alcohol, and a non-complex magnesium dialkoxide, with a halogen compound (b), which is capable of forming the electron donor by replacement of its halogen by said alkoxy moiety.

11. Process according to Claim 10, **characterized** in that said halogen compound (b) has the formula (IV):

$$RXn \qquad (IV)$$

wherein R is an n-valent C_1-C_{20} aliphatic group, an n-valent C_7-C_{27} araliphatic group or an n-valent C_2-C_{22} acylic group, X is a halogen and n is 1 to 6.

12. The complex according to Claim 11, **characterized** in that R is an n-valent C_2-C_{22} acylic group, preferably an n-valent aromatic C_7-C_{22} acylic group, most preferably phthaloyl.

13. Process according to Claim 11 ~~or 12~~, **characterized** in that X is selected from Cl, Br and I, and is preferably Cl.

14. Process according to Claim 11, ~~12 or 13~~, **characterized** in that n is 1 to 4, preferably about 2.

15. Process according to ~~any of Claims 11 to 14~~, **characterized** in that said halogen compound is an organic acid halide, preferably phthalic acid dichloride $Ph(COCl)_2$, wherein Ph is o-phenylene.

16. Process according to ~~any of Claims 10 to 15~~, **characterized** in that said complex of a magnesium dihalide and a magnesium dialkoxide is a magnesium dichloride-magnesium dialkoxide complex of the formula (V):

$$MgCl_2 \cdot [Mg(OR')_2]_p \qquad (V)$$

wherein R' is a C_1-C_{20} alkyl group or a C_7-C_{27} aralkyl group, preferably a C_6-C_{16} alkyl group, and p is 1 to 6, preferably about 2.

17. Process according to Claim 16, **characterized** in that said complex of a magnesium dihalide and a magnesium dialkoxide is a magnesium dichloride-dimagnesium dialkoxide complex of the formula (VI):

$$MgCl_2 \cdot [Mg(OR')_2]_2 \qquad (VI)$$

wherein R' is a C_1-C_{20} alkyl group or a C_7-C_{27} aralkyl group, preferably a C_6-C_{16} alkyl group.

18. Process according to Claim 16, **characterized** in that said magnesium dichloride magnesium dialkoxide complex is prepared by reacting magnesium dichloride with and alcohol into an intermediate which is a magnesium dichloride alcohol complex $MgCl_2 \cdot (R'OH)_{2p}$, wherein R' is the same as above, and reacting the magnesium dichloride alcohol complex with p mol of a magnesium dialkyl $MgR"_2$, wherein R" is a hydrocarbyl group having 1 to 20 carbon atoms.

19. Process according to Claim 18, **characterized** in that, independently, the molar ratio $MgCl_2$:R'OH is between 1:1 and 1:8, preferably between 1:2 and 1:5, the molar ratio $MgCl_2 \cdot (R'OH)_{2p}$:$MgR"_2$ is between 1:1 and 1:4, preferably about 1:2, the temperature is between 80 °C and 160 °C, and the reaction time is about 2 h to about 8 h.

20. Process according to Claim 15 ~~and 17~~, **characterized** in that said magnesium compound (a) which is said magnesium dichloride-dimagnesium dialkoxide complex $MgCl_2 \cdot [Mg(OR')_2]_2$, wherein R' is a C_6-C_{16} alkyl group, is reacted with said halogen compound (b) which is said phthalic acid dichloride $Ph(COCl)_2$, wherein Ph is o-phenylene.

21. Process according to any ~~of Claims 10 to 15~~ Claim 10, **characterized** in that said non-complex magnesium dialkoxide has the formula (VII):

$$Mg(OR')_2 \qquad (VII)$$

wherein R' is a C_1-C_{20} alkyl group or a C_7-C_{27} aralkyl group, preferably a C_6-C_{16} alkyl group.

22. Process according to Claim 21, **characterized** in that said non-complex magnesium dialkoxide is prepared by reacting a magnesium dialkyl, preferably a

magnesium dialkyl of the formula $MgR"_2$, wherein R" is a hydrocarbyl group having 1 to 20 carbon atoms, and an alcohol, preferably an alcohol of the formula R'OH wherein R' is the same as above.

23. Process according to Claim 15 ~~and 21~~, **characterized** in that said magnesium compound (a) which is said non-complex magnesium dialkoxide has the formula $Mg(OR')_2$, wherein R' is a C_1-C_{20} alkyl or a C_7-C_{27} aralkyl, preferably a C_6-C_{16} alkyl, is reacted with said halogen compound (b) which is said phthalic acid dichloride $Ph(COCl)_2$, wherein Ph is o-phenylene.

24. Process according to ~~any of Claims 10 to 15~~, **characterized** in that said complex of a magnesium dihalide and a magnesium dialkoxide is a complex of a magnesium dichloride and an alcohol having the formula (VIII):

$$MgCl_2 \cdot (R'OH)_q \qquad \text{(VIII)}$$

wherein R' is a C_1-C_{20} alkyl group or a C_7-C_{27} aralkyl group, preferably a C_6-C_{16} alkyl group, and q is from 1 to 6.

25. Process according to Claim 24, **characterized** in that said complex of a magnesium dihalide and an alcohol is prepared by reacting magnesium dichloride $MgCl_2$ and and alcohol R'OH, wherein R' is the same as above.

26. Process according to Claim 24 ~~or 25~~, **characterized** in that the reaction temperature is kept between 10 °C and 100 °C, and the reaction time is about from 10 to about 90 min.

27. Process according to Claim 15 ~~and 24~~, **characterized** in that said magnesium compound (a) which is said complex of a magnesium dihalide and an alcohol having the formula $MgCl_2 \cdot (R'OH)_q$, wherein R' is a C_1-C_{20} alkyl or a C_7-C_{27} aralkyl, preferably a C_6-C_{16} alkyl, and q is from 1 to 6, is reacted with said halogen compound (b) which is said phthalic acid dichloride $Ph(COCl)_2$, wherein Ph is o-phenylene.

28. Process according to ~~one of Claims 10 to 27~~, **characterized** in that said magnesium compound (a) and said halogen compound (b) are reacted essentially stoichiometrically.

29. **Use** of a complex according to ~~one of Claims 1 to 9~~ or a complex prepared according to one of Claims 10 to 28 for the preparation of a polymerization catalyst component containing magnesium, transition metal, halogen and electron donor.

30. Use according to Claim 29, **characterized** in that said complex is reacted with a titanium halide (c).

31. Use according to Claim 30, **characterized** in that said titanium halide (c) has the formula (IX):

$$(OR''')_pTiX_{4-p} \qquad (IX)$$

wherein R''' is a C_1-C_{10} alkyl group or a C_7-C_{16} aralkyl group, X is a halogen and p is 0 to 3, and preferably is a titanium tetrahalide TiX_4, wherein X is the same as above, most preferably titanium tetrachloride $TiCl_4$.

32. A complex according to ~~one of claims 1 to 9~~ claim 1, **characterized** in that it shows an IR spectra with a main absorption peak at 1729 cm^{-1} for the C=O...Mg that has shifted 5 to 15 cm^{-1}, preferably 10 cm^{-1} to the right, and preferably also shows three shoulders.